Protecting Our Patients: What Healthcare Organizations Need to Know about Cybersecurity

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About Kaiser Permanente

12.3M Members
22,914 Physicians
59,127 Nurses
217,112 Employees
736 Hospitals, medical offices and other facilities
Agenda

- Learn who is after you – and why
- Understand common attack methods and tools
- Review good security practices
- Discuss joint security governance to balance privacy and security risks with patient care quality and safety
- Consider enabling technologies such as Multi-Factor Authentication

Hacked?
“There are two types of companies: those that have been hacked, and those who don't know they have been hacked.”
John T. Chambers

“Denial Is Not Just a River in Egypt.”
Herb Cain, David Crosby, Al Franken
Health Care: Top Target For Attackers

Snapshot of Corporate Data Breaches, 2013 - 2016

2017 Data Breaches

- **February 2017**
  - Emory Healthcare
  - Ransomware attack;
    - 79,930 patient records breached

- **March 2017**
  - Urology Austin
  - Ransomware attack;
    - 279,663 patient records breached

- **May 2017**
  - WannaCry
    - Ransomware attack;
    - 300,000+ computers infected in over 150 countries
    - 16 UK NHS hospitals infected

- **June 2017**
  - NotPetya
    - Wiperware attack on Ukraine
    - Spilled to many countries
    - Merck, Nuance, 3 US hospitals infected

2019 US Ransomware Impacts

- **363%**
  - Increase in ransomware attacks on business targets 2018 to 2019

- **491**
  - Healthcare providers impacted

- **68**
  - State & county entities impacted

- **1000+**
  - U.S. education institutions impacted

In 1 week in October, 4 healthcare organizations were targeted:

- 3 in Alabama
- 1 in California

Causing hospitals to:

- Redirect ambulances and ask patients to choose other hospitals
- Limit operations to existing patients and “critical new patients"
- Transferring patients from the ED

Sources:

- Gibson Research Center: Security Now 10-08-19
- Bleeping Computer & Malwarebytes: US Accounts for more than half of World’s ransomware attacks
- Gartner: How to Respond to the 2019 Threat Landscape
Can Breaches Kill Patients?

Findings:
• Hospital time to EKG increased 2.7 minutes
• 30 day MI mortality increased 0.36 percentage points = 36 additional deaths for every 10,000 MIs

Cyber Attacks on the Health Care Industry

<table>
<thead>
<tr>
<th>Estimate Value to a Criminal (per record)*</th>
<th>CREDIT CARD</th>
<th>MEDICAL RECORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5 to $15</td>
<td>Short term value (single use)</td>
<td>Up to $1000</td>
</tr>
<tr>
<td>Newer technologies (e.g., Chip and Pin) are making it more difficult to steal</td>
<td>Lagging technology is making theft easier to buy and steal – and driving the cost down</td>
<td></td>
</tr>
</tbody>
</table>

*SOURCE: Flashpoint, Dark Web Monitoring Agent, Federal Bureau of Investigation
### Cybersecurity Threat Actors

#### CYBER CRIME AS A SERVICE

<table>
<thead>
<tr>
<th>Motive</th>
<th>ORGANIZED CRIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financially motivated, paid % of profit</td>
<td>Financially motivated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Allows others to rent infrastructure for attacks: botnets, phishing tools, and vulnerability scanning of targets</td>
<td>Aim to collect ransom, personal data, including medical records, credit cards and social security numbers</td>
</tr>
<tr>
<td></td>
<td>Typically have an industry focus</td>
</tr>
<tr>
<td></td>
<td>Efficient, profit-focused quick attacks with high return on investment</td>
</tr>
<tr>
<td></td>
<td>Increasing sophistication using denial of service ransomware</td>
</tr>
</tbody>
</table>

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### Cybersecurity Threat Actors

#### STATE-SPONSORED

<table>
<thead>
<tr>
<th>Motive</th>
<th>HACKTIVISTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research, espionage and sensitive proprietary information</td>
<td>Motivated by social justice causes to seek confidential information to defame or damage an enterprise</td>
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<th>Characteristics</th>
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<td>Highly-skilled and highly-persistent groups with unlimited resources</td>
<td>Unstructured coalitions of individuals that come together based on common cause</td>
</tr>
<tr>
<td>Employ sophisticated and previously unknown methods (e.g., custom malware, wipeware)</td>
<td>Rely on social engineering techniques</td>
</tr>
<tr>
<td>Pursue and achieve specific objectives</td>
<td>Employ less sophisticated attack methods due to resource limitations</td>
</tr>
<tr>
<td>Maintain a low profile to cover their tracks and remain in the network for months, if not years</td>
<td>Engage armies of infected computers available in the dark web</td>
</tr>
</tbody>
</table>
## Threat Vectors

<table>
<thead>
<tr>
<th>Threat Vector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Engineering</strong></td>
<td>Exploiting human nature</td>
</tr>
<tr>
<td></td>
<td>Email phishing, spear phishing and whaling; telephone and in person</td>
</tr>
<tr>
<td></td>
<td>fraudulent representations</td>
</tr>
<tr>
<td><strong>Internet Surfing</strong></td>
<td>Malware-laced Internet pages, links &amp; downloads</td>
</tr>
<tr>
<td></td>
<td>“Drive-by” and hidden malware</td>
</tr>
<tr>
<td><strong>Credential Theft</strong></td>
<td>Exploiting stolen user IDs &amp; passwords</td>
</tr>
<tr>
<td></td>
<td>Elevated access accounts (system and database administrators, report writers)</td>
</tr>
<tr>
<td></td>
<td>present greatest risk</td>
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<td><strong>Network</strong></td>
<td>Disrupt network traffic, or breach network</td>
</tr>
<tr>
<td></td>
<td>Movement to the cloud expands paths attackers can take, and Denial of Service attacks are challenging to prevent</td>
</tr>
<tr>
<td><strong>Software bugs</strong></td>
<td>Software bugs, and unpatched systems</td>
</tr>
<tr>
<td></td>
<td>Provide breach entry points. Requires ongoing work to keep versions up to date and to apply patches across complex enterprises</td>
</tr>
<tr>
<td><strong>Configuration errors</strong></td>
<td>Systems with configuration errors</td>
</tr>
<tr>
<td></td>
<td>Requires constant testing and assessment of applications and infrastructure. Biomedical devices are a special challenge</td>
</tr>
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</table>
Social Engineering Threats

- **Phishing campaigns**
  - Mass emails from “your bank”
  - Targeted emails from “your boss” (spear phishing)
  - Senior executive targeting – a “subpoena” (whaling)
  - “Angler phishing” is a new tactic where criminals register fake social media accounts that masquerade as customer support accounts
  - They monitor real support accounts for irate customer messages and then quickly jump in to send messages back to those users, loaded with malicious links

- **Imposter domains**
  - Appear to be legitimate websites

- **Phone calls**
  - From “the Help Desk” or “Microsoft” telling you your computer has been infected and they need to remote in to fix it.

Phishing Tips

**Errors and lack of detail**
Be wary of emails with spelling or grammatical errors. Mass phishing emails won’t address you by name; some will address you by your email address.

**Sender name spoofing**
Click on the sender name to see the actual email address. Is it right?

**Check links**
Before clicking a link in email, hover over it with your cursor and look at the bottom of your email window. You’ll see destination. Does it look right?

**Suspicious-looking attachments**
Look at email attachment extensions to verify they are what they should be. File types of high-risk attachments include: .exe, .scr, .zip, .com, .bat.

**Test your team**
Periodically test with fake phishing emails. Provide positive reinforcement (when they are reported) and negative reinforcement, when links are clicked).
Privacy and Security Tips

Watch out for malicious software
Malware can disrupt the operations of your computer. If you suspect you have malware on your system, stop what you’re doing, disconnect from the network and report it immediately.

Smart passwords
Don’t reuse passwords. The first thing attackers will do is to try any passwords they’ve discovered from sites they’ve breached or that they’ve purchased on the Dark Web because they know that people frequently reuse passwords.
Don’t routinely expire passwords. – it just forces people to write them down on paper and in unencrypted files.

The Man Who Wrote Those Password Rules Has a New Tip:
N3v$r M1^d!
Bill Burr’s 2003 report recommended using numbers, obscure characters and capital letters and updating regularly— he regrets the error

SOURCE: Wall Street Journal, 8/7/17, page 1

Privacy and Security Tips

Protect laptops, tablets, and smartphones
Treat your mobile device or laptop like the valuable resource it is. Don’t leave it unattended in insecure locations. Encrypt all devices, so they are useless if stolen.

Keep up to date with patches and antivirus
Create a software and operating system patching process and stick to it. Patches fix security vulnerabilities that are rapidly exploited by hackers. Ensure all computers have up to date antivirus running at all times.

Manage your vendors
Ensure every vendor or outside entity which handles and/or stores your Protected Health Information (PHI) has signed a Business Associates Agreement. Ask them about their patching and antivirus protections. Biomedical vendors may try to hide behind FDA 510k. The FDA’s guidance: “The agency typically does not need to review or approve medical device software changes made for cybersecurity reasons”

SOURCE: https://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm189111.htm
Multi-factor Authentication: Additional Layer of Protection

With hackers increasingly targeting healthcare, usernames and passwords may no longer be enough. A userid and password alone can allow a hacker into your system.

Multi-factor authentication (MFA) requires something else to access systems (especially from outside your corporate network):

At least two of the following
- Something you know: password
- Something you have: a badge or token
- Something you are: fingerprint

MFA done right should enable work and patient care “wherever and whenever”

Build a Collaborative Governance Process

Connect Cybersecurity and clinical experts to minimize patient care and security risks
- Cybersecurity experts know how to protect against IT threats
- Clinical and operational leaders know what it takes to provide safe, high quality healthcare

Bring them together, with the aim of reducing the aggregate level of risk: security risks and patient care risks:
- Working group of key clinical and security experts
- Structured decision venues
- Senior executive oversight of process
Summary

- Healthcare is full of soft targets with money – you have a bullseye on your back
- Keep abreast of the news – know who is after you, your money and your data
- Develop and maintain knowledge of attack methods – and/or work with or hire someone who will
- Educate – and test – your workforce regularly
- Create joint discussion and decision governance
  - Push back when security proposals, policies and initiatives threaten patient care quality and safety
  - Implement enabling technologies that allow your people to get their work done, on site and at home, securely and easily

Paranoia

Success breeds complacency. Complacency breeds failure. Only the paranoid survive.

Andy Grove

Strange how paranoia can link up with reality now and then.

Philip K. Dick

There is no such thing as paranoia. Your worst fears can come true at any moment.

Hunter S. Thompson
Questions?

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